

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

<b><u>Diversion Tunnel Excavation &amp; Blasting &amp; Construction Activity</u></b>			
<u>List of activates</u>			
Ser.	Activity	Ser.	Activity
1	Preparatory works& Co-Activities of other Parties		
2	Spot check for potential safety hazards		
3	Excavations by means of equipment and manually		
4	Drilling		
5	Blasting Activity		
6	Material Storage		
7	Confined Space entry		
8	Hazardous materials Handling and storage		
9	Vehicle Safety & Driving an& transportation & Loading and unloading		
10	Using of Power and Hand Tools		
11	Working at height using Scaffolding		
12	Scaffolding Erection and Dismantling& Manual loading of Scaffold material on vehicle.		
13	Working at height using ladder/ladder Safety		
14	Hot Works (Include; cutting, welding, brazing, etc..)		
15	Lifting Operations		
16	Refueling of Equipment's Generators, Cranes, etc		
17	Workplace Environment		
18	Portable Air Compressor		
19	Dust control		
20	Manual Handling		
21	Concrete Pouring		
22	Management of Change		
23	Night Work		

**RISK ASSESSMENT FORM**  
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**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
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1	– Preparatory works & Co-Activities of other Parties	Improper Planning/ Unskilled Workers/ Improper tools	Workers Injury property damage	2	2	<b>D</b>	– Selection of Competent Workers for the job performed. – Ensure approved MSRA and PTW available at site before start of the job. – Pre job discussion with all team members. – Selection of right tools and Inspection for its good condition before every use. – Ensure close Supervision. – Engineer should co-ordinate with other parties before start of the job. – Any Emergency Situation Observed stop the work and report to the Supervisor for Corrective action immediately before restarting the job. – Secure approved excavation permit and work supervisor shall conduct pre task planning prior to start of work. – Conduct Tool Box Talks for Method Statement/Risk Assessment.	1*2 -
2	– Spot check for potential safety hazards	Animal hurt, vehicle accident	Injury, dead	2	3	<b>C</b>	– Take security guard – Ensure all equipment are in good condition before use and have Inspection tag – If unanticipated services are encountered, work shall cease at that location until the service has been identified and deemed safe – Ensure that all appropriate PPE's such as Safety Glass, Safety Shoes, Hard Hat, reflective vest & Dust mask (if necessary) was worn.	1*2 -
3	– Preparation of works	– Lake of planning and information to persons involved	– Injury to persons – Death to persons	2	2	<b>D</b>	– Secure approved excavation permit and work supervisor shall conduct a pre task planning prior to start of work. – Conduct TBT for MSRA and PTW	1*2 -

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	<ul style="list-style-type: none"> <li>Excavations by means of equipment and manually</li> </ul>	<ul style="list-style-type: none"> <li>failure of equipment</li> <li>Contact with Equipment</li> <li>Fall of personal and other equipment on excavated area</li> <li>collapse of excavation</li> <li>Water</li> <li>Poor Access and Egress</li> <li>Hazard atmosphere inside Excavation</li> </ul>	<ul style="list-style-type: none"> <li>Damage to equipment</li> </ul>				<ul style="list-style-type: none"> <li>Heavy equipment shall have a third party inspection certificate prior to operate at site.</li> <li>Equipment shall be operated only with trained and certified operators.</li> <li>Pre operation check will be conducted by the operator prior use. Defective equipment shall not be used; operator shall report immediately to the supervisor in charge.</li> <li>Equipment shall not be used other than its specific used.</li> <li>Assigned trained and competent banksman for each equipment To ensure that vehicle and personal are kept away from the working area.</li> <li>Warning devices of equipment must be in good working condition.</li> <li>Ensure that all personal remain clear of the swing radius of equipment, be aware of and avoid the operation blind spots</li> <li>Equipment shall not be kept engine running whilst unattended.</li> <li>Install physical barricade with signage's to warn personal.</li> <li>Equipment shall maintain safe distance from excavation area.</li> <li>Soil shall be classify to determine what type to support to be use.</li> <li>All excavation shall be supported when reaching deeper than 2 meters</li> <li>Supports to be install shall be engineered design.</li> <li>Installed Supports shall be regularly checked from cracks.</li> <li>Keep Excavation Soil, tools and material away from the edge of excavation (at least 0.6 meters).</li> <li>Pump out ground water and maintain a dry tunnel.</li> <li>No work shall be performed in excavation or tunnel filed with running or standing water.</li> <li>Employee shall be removed from the tunnel area during rainstorm.</li> </ul>	

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							<ul style="list-style-type: none"> <li>Walkways and means of egress must be kept clear all the time.</li> <li>A competent person shall regularly test the tunnel atmosphere (Oxygen / Co2/etc.) before employee enters it.</li> <li>If there are any hazard condition, proper respiratory protection or sufficient ventilation will be provided.</li> </ul>	
4	– Drilling.	<ul style="list-style-type: none"> <li>Mechanical hurt,</li> <li>Object strike,</li> <li>Fall accident from high place</li> <li>Lack of protective cover</li> <li>Animal hurt</li> <li>High temperature</li> <li>Noise</li> </ul>	<ul style="list-style-type: none"> <li>Injury,</li> <li>dead</li> </ul>	2	2	<b>D</b>	<ul style="list-style-type: none"> <li>Ensure that all appropriate PPE's such as Safety Clear Glasses, Safety Shoes, Hard Hat, reflective vest &amp; Dust mask (if necessary) was worn</li> <li>Operators must undergo pre-job training</li> <li>The drilling machine must be operated by a professional and workers are not allowed to touch it.</li> <li>Providing a hearing protection of noise level if it exceeding limits 85 dB</li> </ul>	1*2 -
5.1	– Explosives magazine	<ul style="list-style-type: none"> <li>inspections by walk around the magazine area</li> <li>working at height</li> <li>Tough manual handling activities</li> <li>Welding activities</li> <li>Moving of vehicle from one place to another.</li> <li>Storage of explosives and dangerous goods</li> </ul>	<ul style="list-style-type: none"> <li>Slips, Trips and Falls. Universal slip, trip and fall culprits</li> <li>Fall from height</li> <li>Fire explosion</li> <li>Flying object may cause eye injury</li> <li>Struck or caught by moving object or machine</li> </ul>	4	4	<b>B</b>	<ul style="list-style-type: none"> <li>Physical risk assessment conducted prior to commence workshop activities</li> <li>Accurate standard for working at magazine</li> <li>No one is allowed to enter work magazine area without proper PPE</li> <li>Standard for WAH, and manual handling</li> <li>Storage of dangerous and flammable equipment standard applied.</li> </ul>	1*3 C

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			– Chemical explosion and in-danger people and facilities					
5.2	– AN store & ANFO storage area	– ANFO mixing by using coxan machine	– Pinch points – Rotating equipment – Diesel spill – Trip and fall, sprains – Dehydration – Knife cuts – Friction points – Fingers caught in sewing machine – Breach of law – Dehydration	4	3	C	– Wear PPE including gloves – Lock out – Correct posture when picking bags up and putting down – Eyes on path – Drinking water available – Task inspections	2*1 -
5.3	– Use dangerous tools	– Cut AN bags by using a knife	– Cut hand and finger – Cut few employee – death	3	3		– Use cut resistant gloves – Cut away from the -body – Cut away from fellow employees – No cutting in a confined space – internal training – to follow work place procedure	1*2 -

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							– internal training – to follow work place procedure	
5.4	– Guard Magazines	– Security at the magazine compound	– Guard is injured, cannot call for help – suffers pain, dies – Adverse weather – rain, wind, lightning. – Attacked by intruders	2	1	-	– Guard patrols only inside magazine fence – Guard raises alarm by calling for help – Equipped to defend themselves – Guard to be aware all the time to avoid Attackers shoot guards	1*1 -
5.5	– Transport explosives to Tunnel	– Explosives vehicle collects the explosives from magazine	– Explosion	4	3	B	– Pre-start inspection – Regular inspections – Only one box at a time – Remove from magazine and hand up to person on vehicle – Explosives in locked bins – Keep to traffic rules – Park away from congested areas – Only one box at a time – Remove from container and hand down to person on ground	1*3 D
5.6	– Transportation of explosives and	– Blasting or Firing	– personal injured or death	2	4	B	– the handling of blasting equipment must not be thrown, smashed, hit, should be handled gently	1*3 D

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	initiating explosive device						<ul style="list-style-type: none"> <li>– transport them to the blasting site with special vehicles..</li> <li>– explosives and initiating explosive device can not mix together</li> <li>– The pipe materials received by the blasting personnel are forbidden to be placed in the explosives box or bag. They should be placed in the tool bag and kept in a safe place. No littering is allowed. The remaining explosive materials are returned to the temporary concurrent custodian and must not be disposed of.</li> </ul>	
5.7	– Blasting charge and plugging	– Blasting	– personal injured even death or Mechanical damage	2	4	B	<ul style="list-style-type: none"> <li>– Use wooden gun sticks to charge</li> <li>– No throwing or impact explosives and initiating explosive device</li> <li>– Fireworks are prohibited during the operation; illumination with open flame is prohibited</li> <li>– The quality of the blockage must be ensured after charging, and deep-hole or shallow-eye blasting is prohibited.</li> <li>– It is forbidden to pull out or hard pull the fuse, detonating cord, detonating tube or electric detonator in the explosive charge or the medicine column.</li> <li>– The stuffing material is selected to discharge the rock powder. It is forbidden to use stones (blockiness greater than 30mm) and flammable materials to fill the blasthole.</li> </ul>	1*3 D
5.8	– Blasting network connection	– Blasting	– personal injured even death	2	4	B	<ul style="list-style-type: none"> <li>– Fireworks are prohibited during the operation; illumination with open flames is prohibited;</li> <li>– Workers with command machinery at the scene</li> <li>– Personnel in the blasting operation wear chemical fiber clothes.</li> </ul>	2*2 D

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							<ul style="list-style-type: none"> <li>Ground and underwater blasting is prohibited on foggy days, dusks and nights.</li> <li>In the event of a thunderstorm, stop the blasting operation and evacuate the danger zone quickly.</li> </ul>	
5.9	<ul style="list-style-type: none"> <li>Blasting warning and Site clearance control</li> </ul>	<ul style="list-style-type: none"> <li>Some personal or mechanical do not leaves away</li> </ul>	<ul style="list-style-type: none"> <li>personal injured even death or Mechanical damage</li> </ul>	2	4	B	<ul style="list-style-type: none"> <li>Before the blasting, the warning work should carry out on-the-spot investigation in the dangerous area determined by the design, comprehensively grasp the situation of the warning range of the explosion area, verify the position of the warning point and the warning sign, and ensure that all channels can be closed.</li> <li>In the open blasting operation area, the warning safety line shall be set within a radius of not less than 300 meters. In particular, at each traffic intersection, the safety ban will be set at the obvious position of the blasting safety, indicating the blasting time, reminding the passing personnel to enter the blasting warning zone; The warning signal approved by the owner blasts and detonates according to the time required by the specified signal.</li> <li>The first signal—the warning signal, after the warning signal is issued, all personnel unrelated to the explosion should be immediately evacuated outside the danger zone or evacuated to the designated safe place. Send alert personnel to the border of the danger zone.</li> <li>The second signal - the detonation signal: the warning signal is sent 10 minutes later, the detonation signal alarm will ring four times, pause for 5 seconds after 5 seconds, then ring again and then stop</li> </ul>	1*3 D



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							until four times. Confirm that the personnel and equipment are all evacuated from the danger zone, and when there is a safe detonation condition, the detonation signal is issued. According to this signal, the blaster is allowed to detonate. <ul style="list-style-type: none"> <li>– The third signal - danger release signal: 10 minutes after the cannon, the inspector can enter the site for inspection. After confirming the safety, the person in charge of the blasting operation notifies the alarm room to issue a danger release signal. The release of the danger warning will sound three times intermittently for 10 seconds, stop for 5 seconds, last for 10 seconds, stop for 5 seconds, last for 10 seconds, and the alarm ends. The post should hold the post before the danger release signal is issued. No one is allowed to enter the danger zone except for the inspectors approved by the blasting work leader. After the inspection confirms the safety, the danger release signal is issued.</li> </ul>	
5.10	– Fire and Blasting	– Blasting early/late	– personal injured even death	2	2	D	<ul style="list-style-type: none"> <li>– Before the blasting, the warning work should carry out on-the-spot investigation in the dangerous area determined by the design, comprehensively grasp the situation of the warning range of the explosion area, verify the position of the warning point and the warning sign, and ensure that all channels can be closed.</li> <li>– After all equipment personnel have withdrawn from the blasting area, the safety officer will inform the blaster to perform blasting detonation after determining the safety.</li> <li>– Use qualified initiating explosive device</li> </ul>	1*2 -

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5.11	– Safety Checking after blasting	– Loose and dangerous rock, blasting harmful gases	– personal injured even death	2	2	D	<ul style="list-style-type: none"> <li>– After the cannon was fired, about 15 minutes, after the ventilation and blowing of the gun smoke, the blasting staff was allowed to enter the blasting operation site.</li> <li>– the blaster check for the presence of dangerous stones and blind guns carefully</li> </ul>	1*2 -
5.12	– Blind cannons to deal with	– Blasting early/late	– personal injured even death	2	2	D	<ul style="list-style-type: none"> <li>– If the blasting network is not damaged, and the minimum resistance line is unchanged, it can be re-initiated; if there is a change in the minimum resistance line, the safety distance should be checked, and the warning range should be increased, and then the line is detonated;</li> <li>– In the hole of the blind cannon not less than 10 times the diameter of the hole of the hole, another parallel hole charge detonation. The blasting parameters are determined by the person in charge of the blasting work;</li> <li>– The explosive used is non-water-resistant ammonium nitrate explosive, and if the hole wall is intact, part of the stuffing can be taken out, water is poured into the hole, and it is invalidated, and then further processed.</li> <li>– If you can find the wire, detonating cord or detonating tube of the detonating network, if it is normal, it can still detonate. You can re-measure the minimum resistance line, redraw the warning range, and detonate the line.</li> </ul>	1*2 -
6	Material storage	<ul style="list-style-type: none"> <li>– Fall of materials</li> <li>– Inadequate storage area</li> <li>– Improper storage</li> </ul>	<ul style="list-style-type: none"> <li>– Property damage</li> <li>– Physical injury</li> </ul>	2	3	C	<ul style="list-style-type: none"> <li>– Good housekeeping</li> <li>– Provide adequate area for storage</li> <li>– Use of experienced personnel</li> <li>– According to stored materials:</li> </ul>	2*1 -

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							<ul style="list-style-type: none"> <li>Avoid direct sunlight, humidity and bad weather conditions</li> <li>Well ventilated storage</li> <li>Segregation of equipment and tools and other chemicals</li> <li>Provide stores by adequate firefighting equipment and safety equipment</li> <li>Provide store by first aid box</li> <li>All access and egress ways must be free of any obstacles</li> <li>All store items must be arranged to be easily accessible</li> <li>Separate non-conformance tool, materials or equipment from valid one</li> </ul>	
7	Confined Space Entry	<ul style="list-style-type: none"> <li>Hydrocarbon gas in combustible range</li> <li>Excessive exposure to hydrocarbon gas</li> <li>Presence of H<sub>2</sub>S gas</li> <li>Insufficiently trained personnel</li> <li>Low percentage of Oxygen</li> <li>Inadequate access leading to inability to escape during emergency</li> <li>Unaware of excavated pit</li> <li>High humidity</li> <li>Pyrophoric iron</li> <li>Inadequate emergency exits</li> <li>Loss of communication between stand by man and working party</li> </ul>	<ul style="list-style-type: none"> <li>Fire or Explosion</li> <li>Respiratory problem</li> <li>Inhalation of H<sub>2</sub>S resulting fatality</li> <li>Suffocation</li> <li>Injuries</li> <li>Excavation caving in</li> <li>Falling in or driving in</li> </ul>	4	3	A	<ul style="list-style-type: none"> <li>Gas test shall be performed before start and in intervals period according to job type and time</li> <li>Use appropriate respiratory protection in case of more than threshold limit</li> <li>Personnel trained in H<sub>2</sub>S awareness with valid entry permit</li> <li>Personnel to carry H<sub>2</sub>S monitor and escape set</li> <li>Tunnel access shall be kept clear and free from any obstacles</li> <li>Adequate ventilation shall be provided</li> <li>Personnel are not permitted to enter into the tunnel if the oxygen level is below 19.5%</li> <li>Stand by man should be kept at the man way</li> <li>Distinguished jacket will be worn by stand by person</li> <li>Records of the people entering into the Tunnel will be maintained by stand by person</li> <li>Stand by man to maintain the communication with the party working inside the tunnel through tow way radio.</li> <li>Tunnel must be provided by evacuation siren for emergency evacuation.</li> </ul>	1*2 -

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							<ul style="list-style-type: none"> <li>Stand by man should not leave that area until he is relieved by another qualified person</li> <li>Stand by man shall have the emergency numbers</li> <li>The Tunnel must be provided by a proper signage system to instruct site personnel "entry for authorized persons only" – "Don't enter without permit" – "Restricted Area"</li> <li>Ensure that personnel who entry the Tunnel taking a proper training for confined space entry and emergency response</li> </ul>	
8	Hazardous materials Handling and storage	<ul style="list-style-type: none"> <li>Health Hazards</li> <li>Spills and leakage</li> <li>Fire</li> </ul>	<ul style="list-style-type: none"> <li>Burn injury</li> <li>Respiratory problems</li> <li>Irritation</li> <li>Poisoning</li> <li>Skin allergy</li> <li>Environmental impact.</li> </ul>	3	4	A	<ul style="list-style-type: none"> <li>MSDS must be provided for all hazardous materials</li> <li>Handling personnel must be familiarization by hazards that arise from this material</li> <li>Good house keeping</li> <li>Barricading the area</li> <li>Proper ventilation</li> <li>Use of required PPE (AS mentioned in MSDS of the hazard substance)</li> <li>Proper packaging and storage</li> <li>Segregation of each material according to risk rate (Oxidizing- Flammable- Reactive- Health – or other hazards)</li> <li>Flammable material storage must be isolated and provided by fire proof electrical installations and bodies</li> <li>All MSDS must be communicated and posted in storing area and operation areas via handling instructions.</li> <li>Shelves must be corrosive and fire resistance</li> </ul>	2*2 D
9	Vehicle Safety & Driving an& transportation & Loading and unloading	<ul style="list-style-type: none"> <li>Vehicle becoming unstable</li> <li>Vehicle collapsing into a hole (if the site isn't adequately compacted)</li> </ul>	<ul style="list-style-type: none"> <li>personal injured or Mechanical damage</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>In case of sand storm / less visibility lifting operation should be reviewed with HSE personnel.</li> <li>No passenger allow to travel on the back of the trailer</li> <li>Ladder will be used to go up on trailer</li> </ul>	1*2 -

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		<ul style="list-style-type: none"> <li>Lack of set-up space</li> <li>Lack of traffic management plan</li> <li>Access/egress: steep grade and short pitch</li> <li>Vehicle collision</li> <li>Worker falling from vehicle during loading and unloading.</li> </ul>					<ul style="list-style-type: none"> <li>Ensure nobody comes under the suspended load</li> <li>Ensure reverse horn of fork lifter / crane working</li> <li>All drivers / operators to have valid driving license</li> <li>No standing at the back of Trailers.</li> <li>Road traffic signs to be followed.</li> <li>Speed limits to be followed</li> <li>Use damage and wedge blocks to prevent material from rolling.</li> <li>Proper House Keeping will be carried out and waste management will be done as per Waste Management Procedure, Management of spills will comply with the measures stated in the Spill Contingency</li> <li>The Transporter should check that:</li> <li>Trucks have restraining spikes in place</li> <li>When loading the vehicle</li> <li>The vehicle and load is stable and load will remain stable during unloading.</li> </ul>	
	Driving of heavy equipment	<ul style="list-style-type: none"> <li>Mechanical damage</li> </ul>	<ul style="list-style-type: none"> <li>personal injured even death</li> </ul>	2	2	D	<ul style="list-style-type: none"> <li>All operating handheld certificates are on duty</li> <li>Workers with command machinery at the scene</li> <li>Sprinklers often sprinkle water to reduce dust</li> </ul>	1*2 -
10	Using of Power and Hand Tools	<ul style="list-style-type: none"> <li>Defective Tools</li> <li>Improper handling</li> <li>Improper storage</li> <li>Misuse of tools</li> <li>Damaged cable</li> </ul>	<ul style="list-style-type: none"> <li>Hand injury</li> <li>Damage to the tool or job</li> <li>Electric Shock</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>Proper inspection and maintenance of tools and must be color coded according to site procedure</li> <li>Replace or repair defective tools</li> <li>Use of proper PPE</li> <li>Use right tool for right job</li> </ul>	1*2 -

**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
		<ul style="list-style-type: none"> <li>Loose components</li> <li>Excess pressure on tools</li> <li>PPEs un-using</li> </ul>	<ul style="list-style-type: none"> <li>Hit by flying fragments</li> <li>Eye injuries</li> <li>Tripping and falling down</li> </ul>				<ul style="list-style-type: none"> <li>Proper storage of tools</li> <li>Experienced personnel shall be assigned electrical work</li> <li>Tools must be used by experienced and competent personnel</li> <li>Tool box talk must be conducted before every job</li> <li>Weekly inspection of tools by competent person.</li> </ul>	
11	Working at height using Scaffolding	<ul style="list-style-type: none"> <li>Unstable scaffolding</li> <li>Overloaded scaffolding</li> <li>Wrong ladder position</li> <li>Defective scaffolding</li> <li>Improper use of scaffolding</li> <li>Faulty erection</li> <li>Defective access device</li> <li>Defective work platform</li> <li>Defective accessories used</li> <li>Overhead power lines</li> </ul>	<ul style="list-style-type: none"> <li>Collapse of the scaffolding</li> <li>Fall of personnel from the height</li> <li>Personnel injury or fatality</li> <li>Loss of property</li> <li>Dizziness and fall from height</li> <li>Trip, slip and fall</li> </ul>	4	3	A	<ul style="list-style-type: none"> <li>Construction and supervision by trained and experienced personnel</li> <li>Daily inspection and certification by a competent person</li> <li>Using company Scaff. Tag system (Red: for invalid – Green: for valid)</li> <li>Effective supervision to prevent overloading</li> <li>Ensure that personnel who working at height not suffering from vertigo or other ill-health that effect on them</li> <li>New workers shall be accompanied to confirm the absence of vertigo</li> <li>Provision of work platform or proper scaffolding for all works above 1.8 m</li> <li>Use of ladders approved construction and specification</li> <li>Position of ladder on firm ground with base to height ratio of 1:4</li> <li>Ensure use of safety harness (Shock absorber + double hocks) with life line</li> <li>Follow all safe work procedures</li> <li>Use all necessary PPE</li> <li>Provide warning signboards, barricades</li> <li>Ensure scaffolding material are in good condition</li> <li>Metal ladder should not be used near electric line</li> <li>Ladder should be at an height of 1.05 m above the working platform</li> </ul>	2*1 -

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

### Hazard Identification and Risk Assessment Sheet for Method Statement No.:

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
							<ul style="list-style-type: none"> <li>Ensure that ladder rung are in good condition</li> <li>Ladder shall not be supported on their rungs and rungs shall not be supported to scaffolds</li> <li>Minimum overlap for four rungs when making extension of ladder</li> <li>Tools should not be carried by person while ascending and descending</li> <li>Holes in platforms through which ladders are passing will be as small as practicable</li> <li>Ladder landing place will be provided in every 9 m height</li> <li>Scaffolding must be provided by guardrail system:                         <ul style="list-style-type: none"> <li>Toe-board minimum 10 cm</li> <li>Mid Rail 55 cm above working platform</li> <li>Handrail 110 cm above working platform</li> </ul> </li> </ul>	
12	<ul style="list-style-type: none"> <li>Scaffolding Erection and Dismantling</li> <li>Manual loading of material on vehicle.</li> </ul>	<ul style="list-style-type: none"> <li>Using non-standard material</li> <li>Presence of irrelevant personnel</li> <li>Falling objects</li> <li>struck against, struck by and fall from height</li> <li>Improperly stored / scattered scaffold material</li> <li>Slip &amp; Trip &amp; Fall</li> </ul>	<ul style="list-style-type: none"> <li>Personnel injury/Fatality.</li> <li>Material Damage</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>Ensure that the Pre-task STARRT talk are conducted by the responsible supervisor/Forman</li> <li>Supervisor to ensure that irrelevant persons are not present in the Scaffolding erection / dismantle / alteration area.</li> <li>Area shall be barricaded and signs posted to identify work hazard.</li> <li>Safety instructions for manual lifting to be discussed in tool box talk by supervisor and followed by workforce.</li> <li>Avoid standing at the edge of the trailer while loading.</li> <li>Only trained &amp; experienced scaffolders will erect / alter / dismantle scaffolds.</li> <li>Supervisor to ensure that a valid PTW is available before start of the job where applicable.</li> <li>Supervisor to ensure the protection of men / equipment / material / structure during scaffold activity.</li> </ul>	2*1 -

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

### Hazard Identification and Risk Assessment Sheet for Method Statement No.:

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
							<ul style="list-style-type: none"> <li>Supervisors to inform other working groups in the vicinity about scaffolding activity.</li> <li>Supervisor to communicate potential hazards of the job to his crew and ensure that control measures are in place against potential hazards.</li> <li>Un-authorized personnel to keep away and don't enter the barricaded area.</li> <li>Scaffold materials shall not be thrown or dropped from heights</li> <li>Helmet with chin strap to be used.</li> <li>Loose material / tools at the height to be properly secured all the time</li> <li>Scaffolders to secure their tools to prevent falling object hazard.</li> <li>Area barricaded and sign posted.</li> <li>Approved / inspected full body harness to be worn and anchored properly.</li> <li>During erection and on incomplete scaffolding, Red tag to be displayed.</li> <li>Scaffolding inspector to inspect and green tag safe scaffolding.</li> <li>Only approved scaffold material to be used for scaffolding</li> <li>All scaffold materials to be checked before site mobilization.</li> <li>Pre-use check before using at site.</li> <li>Scaffold not to be used as support.</li> <li>Guardrail systems shall be installed before an elevated work area may be used by anyone other than scaffolder.</li> <li>Toe boards shall be installed along all edges of elevated scaffold platforms more than 1.8 meters (6 feet).</li> <li>Ladders shall not be painted</li> <li>Do not splice, lash, or tie ladders or ladder sections together</li> <li>Only one person shall be on a single-rung ladder at a time</li> </ul>	



**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
							<ul style="list-style-type: none"> <li>Workers shall not carry tools and materials in their hands when climbing a ladder tools may be carried in secure pockets</li> <li>While climbing or descending workers shall face the ladder</li> <li>Scaffold components shall be free from detrimental corrosion</li> <li>Planks shall not be painted, treated, or coated in any way (except at the ends)</li> <li>Planks shall be properly stacked.</li> <li>Foundations shall be rigid, and capable of carrying the scaffold self-weight plus the maximum intended load without setting or displacement. Unstable objects shall not be used to support scaffolds</li> <li>All scaffold posts (standards) shall be pitched on based plates</li> <li>Scaffold posts and frames shall be erected and maintained vertical checked using a spirit level</li> <li>Runners (ledgers) and bears (transoms) shall be securely fixed to the inside of each post</li> <li>Mobile and tower scaffolds shall be plumb, level, and square and be horizontally and vertically braced</li> <li>Mobile scaffold shall have casters</li> <li>All casters shall be fitted with a positive wheel lock</li> <li>A complete guardrail system shall be provided at every platform</li> <li>A mobile scaffold shall be moved only by manually pushing or pulling at the base</li> <li>Non men, equipment, or materials shall be on the working platform or elsewhere on the scaffold while it is in motion</li> <li>Casters shall be locked at all times except during scaffold movement</li> <li>A guardrail system shall be provided</li> </ul>	

**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدّة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
13	Ladders using	<ul style="list-style-type: none"> <li>Slip and fall hazards</li> <li>Ladder collapsing</li> <li>Electric shock</li> <li>Missing of rungs</li> </ul>	<ul style="list-style-type: none"> <li>Injuries</li> <li>Electrical burns</li> </ul>	3	2	C	<ul style="list-style-type: none"> <li>Check (safety) couplers shall be installed at the tops and bottoms of all hanger tubes</li> <li>Ensure availability of cold water at job site during summer.</li> <li>List of emergency numbers to be made available</li> <li>The ladder must comply with OSHA or other respective standards</li> <li>Never use metallic ladder when working near existing live line</li> <li>Inspect the ladder before use</li> <li>Wooden ladder should never be painted</li> <li>Place the ladder on firm ground</li> <li>Place the ladder at an angle of 75 degree</li> <li>Secure the ladder at the top</li> <li>Wear safety harness while carry out the job</li> <li>Ladder should be one meter more than the working platform</li> <li>Do not carry tools while ascending and descending</li> <li>Do not use one ladder by two people at one time</li> <li>Adequately trained and experienced employees shall be engaged for the job</li> <li>Do not use the ladder with greasy or oily hands</li> <li>Every rungs to be inspected before use</li> <li>Do not modify ladder</li> <li>Tool box talk and Awareness training</li> <li>Don't extend length of ladder by joining two ladders</li> </ul>	2*1 -
14	Hot Works	<ul style="list-style-type: none"> <li>Harmful fumes</li> <li>Fall of job piece due to faulty clamping</li> <li>Presence of flammable gases and flammable materials</li> </ul>	<ul style="list-style-type: none"> <li>Cataract at the long term</li> <li>Burns to body parts</li> <li>Lungs irritation</li> <li>Dermatitis</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>Use of welding shields, goggles, fireproof apron, gloves, screen etc.</li> <li>Proper ventilation (local exhaust, where possible)</li> <li>Proper clamping of the job piece</li> <li>Proper maintenance of the plant, use of shockproof boots and hand gloves</li> <li>Periodical Gas testing</li> </ul>	3*1 D

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

### Hazard Identification and Risk Assessment Sheet for Method Statement No.:

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
		<ul style="list-style-type: none"> <li>Poor ventilation</li> <li>Backfiring</li> <li>Heat</li> <li>Gas leakages</li> <li>Wrong cylinder position</li> <li>Improper earthing</li> <li>Electrical Hazard</li> <li>Exposure to arc radiation</li> </ul>	<ul style="list-style-type: none"> <li>Electric shock</li> <li>Fire</li> <li>Explosion</li> <li>Suffocation</li> <li>Spread of flames</li> </ul>				<ul style="list-style-type: none"> <li>Adhere PTW system</li> <li>Assigning fire watcher to monitor the hot works if applicable</li> <li>Use of trained personnel</li> <li>Check welding equipment before use</li> <li>Cylinder should be kept in separate area</li> <li>Ensure flash back arrestors provided on cutting sets</li> <li>Flammable material shall be removed from the area of operation before start work</li> <li>Check maximum RPM of the disk shall be checked against the operating RPM of the grinder</li> <li>Keep unauthorized people away from the area</li> <li>Tool talk to work force</li> <li>All equipment shall be provided with GFCI</li> <li>Provide exhaust fans in confined spaces and wherever necessary</li> <li>Hot surface should be marked to alert people</li> <li>Fire extinguishers shall be provided in the welding area</li> <li>Screen should be provided around welding area wherever applicable</li> <li>SIMOPS must be taken into account</li> </ul>	
15	Lifting Operations	<ul style="list-style-type: none"> <li>Mechanical Hazards</li> <li>Health Hazards</li> </ul>	<ul style="list-style-type: none"> <li>Falling or tripping over of lifting equipment.</li> <li>Falling object from height</li> <li>Risk of load sway</li> <li>Waist and back pain</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>Lifting equipment must have valid calibration certificate</li> <li>Lifting gears must have valid calibration certificate</li> <li>Ensure lifting equipment operator competency</li> <li>Ensure that the weight of load is within the safe working load (SWL) limit of the certified crane and well balanced</li> <li>Operator must use safety features built into crane e.g. outriggers fully extended, to ensure the crane is stable. On soft ground, proper support must be provided</li> <li>One competent rigger only to give signals to the crane operator</li> </ul>	2*1 -

**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

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			<ul style="list-style-type: none"> <li>– Injuries</li> <li>– Materials or equipment damage</li> </ul>				<ul style="list-style-type: none"> <li>– Riggers must monitor the load at all times and control with tag lines</li> <li>– Lifting equipment operator shall never leave the crane unattended while the load is suspended.</li> <li>– Before starting any movement of the crane, warn the other workers by blowing horn</li> <li>– Load must not be carried over people.</li> <li>– Ensure that all lifting slings are certified and without defects</li> <li>– Follow proper manual lifting methods. Use sufficient personnel and PPE for heavy loads</li> <li>– Induction course shall be made to the workers, no stay under lifted loads</li> <li>– Lifting plan and method statement must be submitted in case of heavy or critical lifting operations</li> </ul>	
16	- Refueling of Equipment's Generators, Cranes, etc	<ul style="list-style-type: none"> <li>– Environmental hazard due to Spillage of oil during refueling</li> <li>– Fire Hazards during refueling.</li> <li>– Personal injury due to slip / trip</li> <li>– Inadequate hose connection</li> <li>– Struck against / Struck by Over fueling</li> </ul>	<ul style="list-style-type: none"> <li>– Environmental palliation.</li> <li>– Personal Injury</li> <li>– Burns</li> <li>– Fire</li> <li>– Death</li> </ul>	3	3	B	<ul style="list-style-type: none"> <li>– Stay near your equipment's fueling point when refueling.</li> <li>– Ensure a safe access to the equipment to be refueled</li> <li>– Wearing of appropriate PPE'S at all time during refueling</li> <li>– Switch off equipment before starting refueling</li> <li>– Never overstretch refueling hose</li> <li>– Never overfill or top the fuel tank</li> <li>– Refueling to be done at slow rate to reduce the potential for spillage and static ignition buildup</li> <li>– Let the fuel dispenser shut off automatically and leave the nozzle in the tank for six to eight seconds so the fuel can settle down and any fuel in the nozzle can drip down into fuel tank</li> <li>– Ensure drip tray under the equipment to be refueled.</li> <li>– Hose and refueling assembly should be in good condition</li> <li>– Refueling to be done only by refueling vehicle and trained person.</li> </ul>	1*2 -

**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
							<ul style="list-style-type: none"> <li>- If fuel is needed to be taken on site in cane, use the recommended jerry cane</li> <li>- Ensure the availability of fire extinguisher near refueling point</li> <li>- No ignition source /smoking near refueling point</li> <li>- Switch off mobile phone before starting refueling</li> </ul>	
17	Workplace Environment	<ul style="list-style-type: none"> <li>- Noise</li> <li>- Heat</li> </ul>	-	3	3	B	<ul style="list-style-type: none"> <li>- Insulate as far as possible all noise sources</li> <li>- Make personnel wear ear protection</li> <li>- Make sure that personnel involved have a sufficient amount of water to compensate for dehydration (salt pills may be distributed under medical control)</li> <li>- Make sure that personnel wear suitable personal protective equipment</li> </ul>	3*1 D
18	- Portable Air Compressor	<ul style="list-style-type: none"> <li>- Unsecured hoses whipping under pressure.</li> <li>- Compressed air.</li> </ul>	- Personal Injury	3	3	B	<ul style="list-style-type: none"> <li>- Locate and ensure you are familiar with all machine operations and controls.</li> <li>- Check workspaces and walkways to ensure no slip/trip hazards are present.</li> <li>- Put the compressor in a suitable location for safe operation.</li> <li>- Lock the wheels on the base of the compressor to prevent movement.</li> <li>- Check that all fittings and connections are in good condition.</li> <li>- Check all fittings are securely connected before being pressurised.</li> <li>- Start the compressor, noting pressure increase and cut-out/cut-in pressure.</li> <li>- Listen for any air leaks from any flexible airlines and immediately report if any leaks are found.</li> <li>- Adjust pressure regulator to suit work requirements.</li> <li>- Check the compressor at regular intervals.</li> <li>- Switch off machine when work completed.</li> </ul>	1*2 -

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

### Hazard Identification and Risk Assessment Sheet for Method Statement No.:

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
							<ul style="list-style-type: none"> <li>Leave the machine, hose and work area in a safe, clean and tidy state.</li> </ul>	
19	Dust Control	-Dust generated from tunnel excavation & blasting and vehicle movements	-Occupational health & safety risks to the workers - Environmental pollution	2	2	D	<ul style="list-style-type: none"> <li>Provide misting water sprays sufficient to reduce airborne dusting from demolition work;</li> <li>Apply additional water dust suppression applied during dry weather; and</li> <li>Avoid dust-generating work must be avoided on high wind days.</li> <li>Demarcate construction areas from adjacent spaces with appropriate signage;</li> <li>Provide barrier protection at the entrance to the construction area, an exhaust fan within</li> <li>Spray water (amended with a small amount of detergent) during Construction activity, as required, to reduce airborne particles;</li> </ul>	1*2 -
20	Manual Handling	-Transferring and handling material Manually	<ul style="list-style-type: none"> <li>Personnel Injury</li> <li>Damage to Material</li> <li>Delay in Productivity</li> </ul>	2	3	C	<ul style="list-style-type: none"> <li>All workers must be trained and experienced for similar jobs.</li> <li>Proper Lifting techniques to be adopted for manual handling</li> <li>Use of appropriate hand gloves</li> <li>Avoid manual handling for heavy materials</li> <li>Ensure proper material management and avoid obstruction to the access/egress.</li> <li>Proper housekeeping and material management.</li> <li>All work should be carried under the close supervision</li> </ul>	1*2 -
		-	- Damage/ faulty lifting Equipment	2	2	D	<ul style="list-style-type: none"> <li>All Lifting equipment/ tools must be inspected before use and should have valid TPI certificate.</li> <li>Inspection and colour coding of rigging gear shall be ensuring that the gear has not suffered any damage as a result of previous use.</li> </ul>	

**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

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							– Damage equipment to be destroyed or removed from service to prevent further use.	
21	-Concrete Pouring	<ul style="list-style-type: none"> <li>– Working without valid work permit.</li> <li>– Slip and trip</li> <li>– Eye hazards from foreign objects.</li> <li>– Skin irritation contact with cement.</li> <li>– Environmental hazards spillage of concrete.</li> <li>– Collapsed of foundation.</li> <li>– Puncture wound from protruding nails</li> <li>– Equipment use for concrete pouring run or struck person</li> <li>– Tipped over of pump truck.</li> <li>– Failure of support system and/ or plat form</li> <li>– Manual Handling</li> <li>– Concrete pumping operation</li> </ul>	– Personal Injury	1	3	D	<ul style="list-style-type: none"> <li>– Supervisor to ensure valid working permit is available at work area before start of work. Toolbox meeting shall be conducted and discuss the work procedure and safety precautions.</li> <li>– All people to wear eye protection. Face shield must be worn by the worker assigned to hold for the hose when pump truck is utilized.</li> <li>– All people to wear long sleeves and proper safety boots.</li> <li>– Any spillage of cement must be collected immediately.</li> <li>– Sufficient support shall be provided to form works to be erected.</li> <li>– Ensure that any nails protruding are either bend or removed.</li> <li>– Pump truck to be parked on a safe and level working area.</li> <li>– Concrete support system is to be installed by competent person. Inspect all support systems and platforms immediately prior to the pour .use an appropriate means of pouring/delivering the concrete.</li> <li>– Make best use of concrete chutes and pumps to place the majority of the west concrete- thereby reducing work with the shovel. Reduce bending, twisting and stooping action. Provide information associated with manual handling operation.</li> <li>– All concrete pumping operations are to be undertaken with the supervision of a competent person,</li> </ul>	1*2 -
22	management of change	Hazards according to the changes: 1. Process 2. Materials		-	-		<ul style="list-style-type: none"> <li>– All changes should be considered and managed during the design and execution phases.</li> <li>– Specific risk assessment should be performed before work start.</li> <li>– All changes should be announced to the concerned parties.</li> </ul>	--

## RISK ASSESSMENT FORM

نموذج تقييم المخاطر

### Hazard Identification and Risk Assessment Sheet for Method Statement No.:

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

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Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدّة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
		3. Manpower 4. Working Environment 5. Working Place etc.						
23	– Night Shift work	– Poor Lighting	– Traffic Accidents – Tripping Hazards – Falling Accidents – Tiredness/ Lack of concentration –	2	3	C	– Night Shift/Over Time PTW should be released before the shift – Ensure adequate lighting around the worksite to avoid shadowed areas where persons can trip over poorly lit objects. – Ensure all roads leading to the site are adequately delineated. – Ensure Medical Staff is aware of the Night work and the responsible duty Supervisor is on call, with sufficient charged radios at the worksite. – Ensure walkways are free from any obstacles or tripping hazard. – Ensure that their workers are not working excessive hours and have proper rest breaks. – Ensuring emergency light is in operation during lighting shutdown. – Meals to be taken at the normal time or special arrangements made in advances for food to be provided for the workforce. – No night works to be carried out without written authorization from JV Management.	1*2 -

Mandatory PPE	Safety Helmet, safety Glasses, High Visibility vest, Safety Shoes.
Specific PPE	Cut Resistance gloves, Cutting and Grinding Face shield, Ear Muffs and Ear Plugs .dust or gas musk
Mandatory training	Site HSE induction, Working at heights, Confined Space Entry, Scaffolding Safety, Permit To work, Firefighting, First Aid , Lifting and Rigging operations safety, manual Handling.



**Hazard Identification and Risk Assessment Sheet for Method Statement No.:**

**Title:** Diversion Tunnel Excavation & Blasting and Construction Activity

**Project:** RFHPP 2115 MW

**Date:** 25.06.2019

**KKS No.:** Diversion Tunnel

**Revision:** 0

Ser.	Task Steps خطوات العمل	Hazard المخاطر	Hazard Effect تأثير الخطر	Severity الشدة	Probability الإحتمالية	Risk Rating تصنيف الخطر	Control Measures إجراءات التحكم	Residual Risk
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**Probability (P)**

1 = Very Low  
2 = Low  
3 = Medium  
4 = High

**Severity (S)**

1 = Light  
2 = Medium  
3 = Severe  
4 = Extreme

**Risk level (R)**

P/S	S1	S2	S3	S4
P1	-	-	D	C
P2	-	D	C	B
P3	D	C	B	A
P4	D	B	A	A

B - A = Risk reduction urgently necessary

D - C = Risk needs to be reduced

- = Risk is acceptable